

WHAT IS CLAIMED IS:

1. A load cell comprising:
  - a first sensor support assembly and a second sensor support assembly, each sensor support assembly comprising an assembly having:
    - a rigid central hub having an end plate and a support element extending transversely from the end plate; and
    - a rigid annular ring concentric with the central hub;
  - a mount joined to the end plate of the first sensor support assembly, the mount being spaced apart from and extending in the same direction as the support element of the first sensor support assembly;
  - a first plurality of sensing devices operably coupled between the support element of the first sensor support assembly and the corresponding annular ring;
  - a second plurality of sensing devices operably coupled between the support element of the second sensor support assembly and the corresponding annular ring; and

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wherein the end plates of the first and second sensor support assemblies are joined together.

2. The load cell of claim 1 wherein the central hub, annular ring and sensing devices of each sensor support assembly are integral.

3. The load cell of claim 2 wherein each sensing device comprises an integral radial tube with sensors operably coupled thereto.

4. The load cell of claim 3 wherein each sensor support assembly includes an integral flexure member extending between an end of each radial tube to at least one of the annular ring and central hub, the flexure member being compliant for displacements of each corresponding radial tube along the corresponding longitudinal axis.

5. The load cell of claim 2 wherein each sensor support assembly includes a flexure member for each sensing device, the flexure member being formed integral with at least one of the annular ring and central hub, the flexure member being compliant for displacements of each sensing device along the corresponding longitudinal axis.

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6. The load cell of claim 1 wherein the end plates of the first and second sensor support assemblies are integral.

7. The load cell of claim 1 and further comprising:

a second mount joined to the end plate of the second sensor support assembly, the second mount being spaced apart from and extending in the same direction as the support element of the second sensor support assembly.

8. The load cell of claim 7 wherein each end plate, the first-mentioned mount and the second mount include a bore, the bores being aligned to form a common bore through the load cell.

9. The load cell of claim 8 and further comprising:

a first bearing mounted in the first mount;  
a second bearing mounted in the second mount;  
a shaft supported by the first and second bearings extending through the common bore.

10. The load cell of claim 7 and further comprising:

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- a first passageway in the first mount fluidly coupled to a fluid source and adapted to receive a cooling fluid;
- a second passageway in the second mount fluidly coupled to the fluid source and adapted to receive the cooling fluid.

11. The load cell of claim 1 and further comprising an insulating element disposed between the first mount and the end plate of the first sensor support assembly.

12. A load cell body comprising:

- a first sensor support assembly and a second sensor support assembly, each sensor support assembly comprising an integral assembly having:

- a rigid central hub having an end plate and a support element extending transversely from the end plate;

- a rigid annular ring concentric with the central hub; and

- at least three load sensing radial tubes extending radially from the central hub to the annular ring; and

- wherein the end plates of the first and second sensor support assemblies are joined together.

13. The load cell body of claim 12 wherein each sensor support assembly includes an integral flexure member extending between an end of each radial tube to at least one of the annular ring and central hub, the flexure member being compliant for displacements of each corresponding radial tube along the corresponding longitudinal axis.

14. The load cell body of claim 12 wherein each sensor support assembly includes a flexure member for each sensing device, the flexure member being formed integral with at least one of the annular ring and central hub, the flexure member being compliant for displacements of each sensing device along the corresponding longitudinal axis.

15. The load cell body of claim 12 wherein the end plates of the first and second sensor support assemblies are integral.

16. The load cell body of claim 12 and further comprising:

a first mount joined to the end plate of the first sensor support assembly, the first mount being spaced apart from and extending in the same direction as the support element of the first sensor support assembly; and

FOOTNOTES

a second mount joined to the end plate of the second sensor support assembly, the second mount being spaced apart from and extending in the same direction as the support element of the second sensor support assembly.

17. The load cell of claim 12 wherein each end plate, the first mount and the second mount include a bore, the bores being aligned to form a common bore through the load cell.

18. The load cell of claim 17 and further comprising:

- a first bearing mounted in the first mount;
- a second bearing mounted in the second mount;
- a shaft supported by the first and second bearings extending through the common bore.

19. The load cell body of claim 12 and further comprising a strain sensor mounted on selected radial tubes to measure strain therein.

20. The load cell body of claim 19 wherein the strain sensor comprises shear sensors mounted to each radial tube.

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21. The load cell body of claim 19 wherein the strain sensor comprises a bending sensor mounted to each radial tube.

22. The load cell body of claim 12 wherein the annular ring includes an aperture aligned with each bore of the radial tubes.

23. The load cell body of claim 20 wherein an outer surface of each radial tube includes a plurality of surfaces and wherein the shear sensors are mounted to surfaces.

24. The load cell body of claim 23 wherein the outer surface is an octagon.

25. The load cell body of claim 12 wherein four radial tubes extend from the central hub to the annular ring, wherein a first pair of radial tubes are substantially aligned on a first axis, and a second pair of tubes are substantially aligned on a second axis, the first axis being substantially orthogonal to the second axis.

26. A load cell comprising:

first sensor support means for supporting a  
first plurality of sensing devices;  
second sensor support means form supporting  
a second plurality of sensing devices;

2025 RELEASE UNDER E.O. 14176

mounting means for reducing heat transferred from a member connected to the mounting means to the first plurality of sensing devices and to the second plurality of sensing devices.

27. The load cell of claim 26 and further comprising:

insulating means for insulating heat from the first sensor support means to the mounting means and from the second sensor support means to the mounting means.

28. The load cell of claim 26 and further comprising;

cooling means for cooling the mounting means.

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